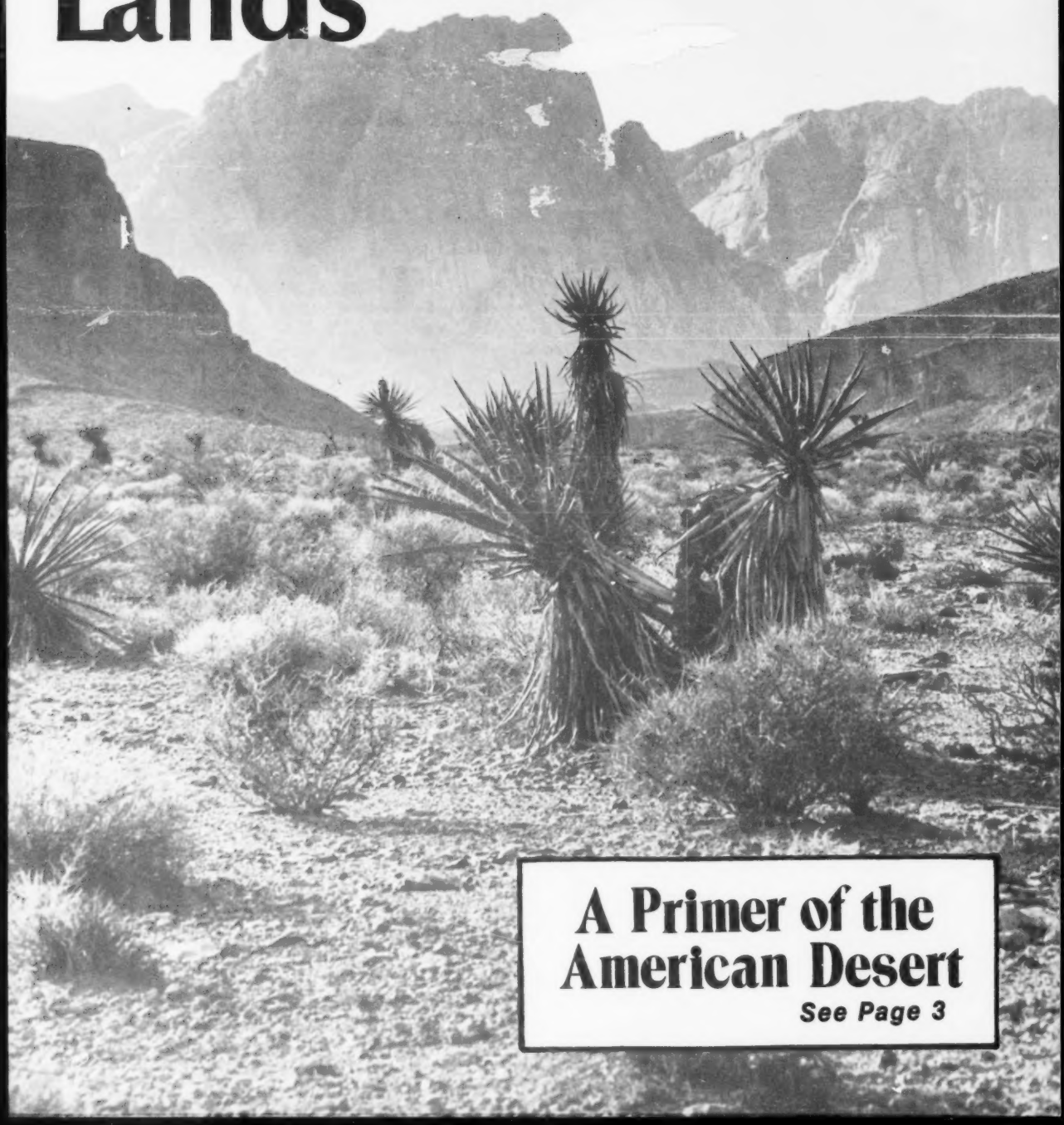
Our Public Lands

WINTER 1979



A Primer of the American Desert

See Page 3

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Our Public Lands

WINTER 1979
Vol. 29, No. 1

Contents

3 **A PRIMER OF THE AMERICAN DESERT**

7 **DESERT DANGERS**

8 **THE CACTUS NAPPERS**
Robert J. Sulenski
Washington Office

12 **SAND FOR RECREATION**
Stewart L. Jacobson
Richfield, Utah District Office

15 **RANGER IN THE DESERT**
Steve Smith
California State Office

19 **THE BUYING OF LOUISIANA**
Paul C. Herndon
Washington Office

A Primer of the American Desert

The Deserts of the United States Host Plants and Animals Well Adapted to Life in a Land Where Rain Rarely Falls.

Approximately one third of the earth's land surface is desert. Deserts are found on every continent; however it is the arid regions of the United States that are our primary concern in this article. Our deserts are in the west and primarily in the southwest.

The *Great Basin Desert* covers much of eastern Oregon where it is known as the Oregon Desert. From there it extends south and east to cover parts of Idaho, Utah, Nevada, and a small part of Colorado.

The *Mohave Desert* is found in southeastern California and southern Nevada.

The *Sonoran Desert* is found in the extreme southeastern part of California and in western Arizona.

The *Chihuahua Desert* lies in southern New Mexico and western Texas. These latter two deserts also extend across the border into northern Mexico.

Dryness is the single characteristic common to all deserts, but dryness is never absolute. The dryest spot on earth is found in the Atacama Desert on the west coast of South America. There rain may fall only two to four times in a century. There is no spot on earth where rain does not eventually fall.

Geographers speak of deserts, semi-deserts and arid lands, but do not agree on the distinction between these terms, and rainfall alone is not the only factor that makes a desert. As a rule we classify an area as desert if it has less than 10 inches of rainfall a year, but there are important exceptions.

There is, for example, less precipitation on the North Slope of Alaska than in the Arizona Desert. Yet the landscape on the North Slope is pock-marked with lakes, ponds and puddles and looks more like a swamp than a desert. There are many differences between the North Slope and the Arizona desert, and a major one is the rate at which water evaporates. The rain that falls on the Arizona Desert is quickly reabsorbed by the hot dry air. The cold temperatures that prevail across the North Slope allow little of the water that falls there to be evaporated.

Furthermore, the North Slope is flat, and a frozen permafrost underlies the surface of the soil. Run-off is exceedingly slow and almost no water is absorbed into the ground. The small amount of water that falls on the North Slope stays on the surface, while in the Arizona Desert it evaporates, runs off, or sinks into the dry desert sands beyond the reach of plants and animals.

Inadequate rainfall is the result of different combinations of circumstances. The Atacama Desert of South Africa and the Namib Desert on the west coast of Africa are "fog" deserts. Cold Antarctic currents moving up the respective

coasts of the two continents cause thick fogs that move inland in the early morning hours, but climatic conditions are such that the fog does not condense into rain.

Our deserts are quite different. They are the result of rain-shadows cast by our coastal mountain ranges.

A rain shadow is formed when mountains interfere with the flow of the prevailing winds. In our hemisphere, these prevailing winds blow from west to east.

Water vapor is absorbed by warm air and condenses back into liquid when the same air is cooled. As the prevailing winds cross the Pacific Ocean, they absorb moisture from the surface of the sea. On reaching land, the currents of air are forced upward by the mountains of the coastal range and later by higher mountains further inland. At the higher altitudes, the air cools and the heavy burden of moisture condenses to fall as rain or snow along the western slope of the mountains.

After crossing the crest of the mountain, currents of air flow down the east slope of the mountains and are warmed at the lower altitudes. Higher temperatures increase their capacity to hold the remaining moisture.

The contrast between the west and east slopes of a coastal range is often dramatic. One can often travel from a rain forest where the annual rainfall may exceed 100 inches to a desert having less than 10 inches within a few short miles.

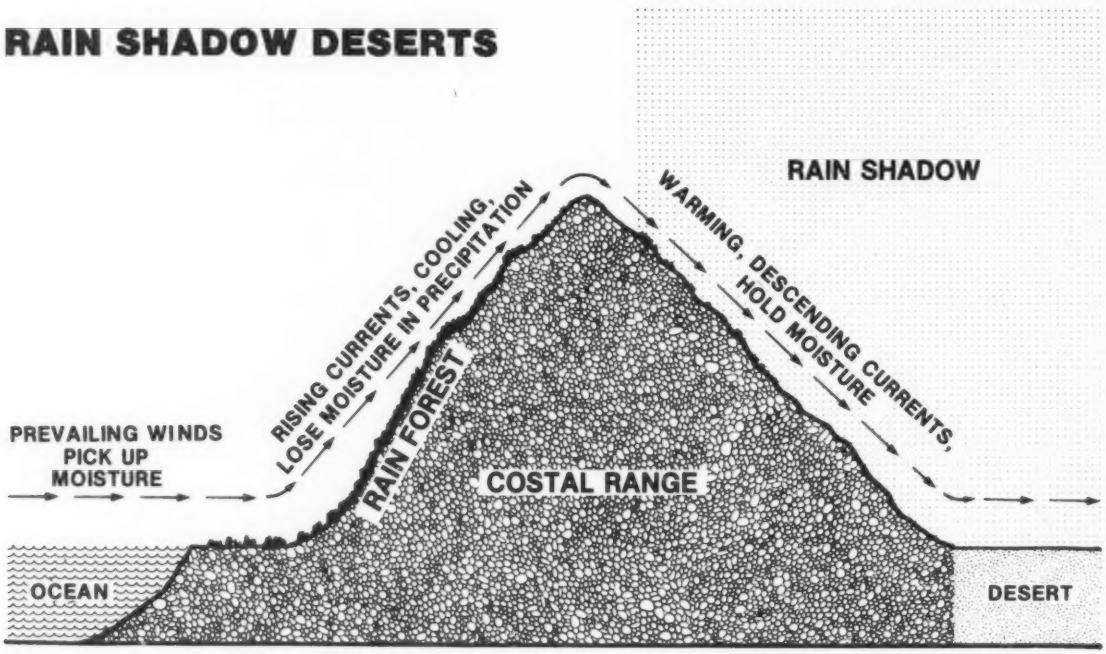
Desert areas tend to be ruled by extremes. The desert condition results not only by low levels of precipitation, but by the fact that the rain that does fall is highly sporadic. One criteria of a desert is the high probability tht there will be no rain for periods in excess of a year. Conversely, a single thunder storm may dump more than a year's quota of rain upon a desert area in a single afternoon. After such a storm, dry lake beds are temporarily filled, and the rapid run-off cuts gullies and may send a wall of water down an arroyo, making drowning one of the hazards of desert recreation.

Deserts also tend toward extremes of temperature. Since there are no trees to shade and the clear desert air provides no overlay of cloud, the desert soil gets the full impact of the sun. After a morning spent in sightseeing along the high rim of the Grand Canyon, this writer descended to the Arizona desert in an air-conditioned car. It was not until we left the car at a roadside pull-off that we realized how much difference a few thousand feet of elevation and adequate ground cover could make in the temperature. As we opened the door of the car, the impact of the 117 degree temperature desert was like opening the door of a blast furnace.

Deserts can also be extremely cold. The lack of clouds and ground cover that allows the soil to absorb heat by day, also allows that same heat to be reflected back into the atmosphere after the sun goes down. Hot days may be followed by cool nights, and in the winter, cold north winds make some deserts miserable places to be.

Many people think of deserts as areas of drifting sand dunes, devoid of all life. In fact, sand dunes make up only a small part

RAIN SHADOW DESERTS



Austere landscapes create a strange beauty in the desert.

of the desert areas of the world. Despite their extreme aridity, deserts show a surprising variety of living forms. Yet only those plants and animals that have come to terms with a lack of water can survive there.

Desert plans have adapted in a number of ways to cope with the lack of moisture that is charcteristic of the desert environment. Among these are the following:

Wide spacing between individual plants. One authority has defined a desert as a placce where more than 50 percent of the ground is bare. This wide spacing is both the result of and a defense against dryness. With less density, the plant that does grow has less competition for the available water.

Developing ingenuious ways to secure water. Even the driest desert always has some moisture available. Many desert plants have specialized in developing ways to get this water for their own use. Plants like the mesquite send their roots deep into the subsoil in search of ground water. Other plants take advantage of the dew that condenses from the atmosphere.

Becoming dormant during extremely dry periods. The seeds of some desert plants have been known to sprout after lying dormant for 45 years. Others have roots or bulbs that remain dormant during the dry periods. The advantage of a seed that will not germinate until there is sufficient moisture for the plant to grow and reach maturity is obvious in a desert environment. Many of these same plants have the ability to reach maturity within the short period of time that moisture will remain in the ground after a rain.

The ability to store or conserve water. Many of the plants in the desert avoid the problems associated with extreme dryness by waiting out the dry period, but others meet the challenges of aridity head on. The barrel cactus can store large quantities of water in its tissues. Cacti also have waxy skin to prevent water from escaping. Plants like the cactus and the poloverde either have small leaves, or no leaves at all. This cuts the amount of water lost through transpiration. Some of the desert plants that have leaves, lose them during extremely dry periods.

The desert is as demanding of its animal population as it is of its plant communities. Still, the variety of animal life approaches that of plants. To survive in the desert, an animal must find a way to cope with both heat and the lack of water.

As a matter of record, deserts are the hottest places on earth. The highest temperature ever to be recorded was 136 degrees. That was recorded in the Sahara Desert of North Africa. North America's deserts are not far behind. A 134 degree temperature was recorded in California's Death Valley.

For the animals that make the desert home, the problem associated with heat and aridity are closely related. When water is abundant most animals, including man, can cope with the desert temperatures. But for many desert animals, the trick is to cope with high temperatures with a minimum of water. Heat tends to steal water from animal tissues, leaving the animal to die of dehydration. In a desert environment a man can lose up to 12 quarts of water a day from perspiration alone. Rarely, if ever, do desert animals have this much water at their disposal. They have to keep cool while conserving the limited water that is available. Fortunately, most animals do not prespire as readily as man.

As with plants, desert animals may choose to avoid heat and dryness, to escape from it, or meet it head on.

Many species of desert animals avoid aridity by timing their life cycles to coincide with the times when moisture is available. The tadpole shrimp is a classic example. (See Gill Foot — Nature's Patient Child, *Our Public Lands,* Summer 1977.) The eggs of this Branchipod may lie dormant in the dust of a dry lake bed for years waiting for a summer storm to fill the bed with the water that will allow it to hatch and grow to adulthood during the short time that water remains in the fast drying lake bed.

Other animals escape the heat to conserve their water resources by sleeping through the hottest part of the year. This sleep, which drastically reduces the animal's metabolic rate and consequently its need for water, is called, "estivation." It may be compared with hibernation in which animals sleep through the cold of winter.

Some animals that lack the ability to estivate, apply a similar technique by retreating to deep underground burrows during the heat of the day. There temperatures seldom rise above 85 degrees, and the burrow serves as a chamber to contain the moisture the animal loses through respiration.

As a rule of thumb, desert animals tend to rest during the hottest part of the day. Most become active either at night or during the cooler hours at dawn and dusk.

At a desert waterhole an observer is apt to see a great variety of animal life. Since surface water is limited to a relatively few areas, where water does exist, it acts as a magnet and attracts animals from a wide area.

Most desert animals will drink when free water is available, but many can survive without it. All foods, plant or animal, contain some water. The moisture contained in succulent plants and the tissues of animal prey is enough to keep many desert animals alive when free water is not available. But there are some that can survive even when moist foods are not available

All animals, including man, have the ability to create what is called "metabolic water" in their tissues. They do this by converting hydrogen and oxygen found in fats and carbohydrates into water. For man, this water is insignificant when compared to body needs, but for some animals, this metabolic water is enough for survival.

To get by on metabolic water, the animal must be extremely stingy in its use of water. The entire physical process of these animals is geared to conserving water. They have few or no sweat glands, the viscosity of the blood is much thicker than for animals that have access to free water, urine is highly concentrated, and fecal matter is retained in the body until all possible moisture is absorbed by body tissues. These animals also tend to be small, presenting a favorable ratio between bulk and surface area, for the retention of water.

While the overall desert may be extremely dry, water may be permanent and abundant in localized areas. This water does not originate in the desert, but is the result of rain that falls in more hospitable areas beyond the desert rim. Water may cross the desert in streams (the Nile across the Sahara, the Colorado across the Sonoran), break free in the form of springs, or wait beneath the surface as an underground reservoir that can be tapped by a well. Desert soils are frequently fertile, and the productivity of such an oasis is often limited only by the amount of water available.

Archaeology students dig in 4300 year-old Mojave footprint site near Victorville, California.

Plants and animals that would not be able to survive in the drier parts of the desert may be found about an oasis. Among those who may make the oasis home is man.

Despite the hostile environment, men have crossed and lived in the desert since prehistoric times. Perhaps of all the desert's inhabitants. Man is least suited to survive there. Unlike so many of the desert's inhabitants, man has not developed adaptations that would enable him to stay alive for more than a few days when exposed to the full impact of the desert's heat and aridity.

Man does survive in the desert by the simple expedient of taking the essential elements of his environment with him or by clinging close to those oases where the extremes of the desert environment are held at bay by the presence of water.

Today the automobile has made our deserts accessable to millions of Americans. Fast transportation has further removed much of the danger from a desert crossing.

A dune buggy in the Imperial Sand Dunes east of El Centro.

If the values of deserts are intangible, the public's response to those values is not. Each year BLM hosts millions of visitors seeking recreation on desert lands under the jurisdiction of the Bureau's California state office.

The values people seek in visiting the desert are as varied as the individuals who go there, but certain values seem self evident.

For one, the desert is different and more especially if the visitor comes from an area having abundant rainfall. From the picturesque Joshua tree to the towering Cholla, the plants are unique to the desert environment. Mountains are stark — seemingly devoid of vegetation.

Deserts also provide open spaces and convey the concept of vastness. Man and his problems tend to be dwarfed in the realm of the desert.

Deserts help us to reassess our sense of values. There the water we so casually take for granted becomes incalculably valuable, while the values of other environments pall as one faces the challenge of mere survival.

Deserts have scientific and cultural values. Their ecology is relatively simple, and the special adaptions of their living forms are pronounced. Because of the harsh environment, deserts are a storehouse of archaeological treasures. The dry atmosphere of the desert acts as a preservative for animal remains and artifacts. Since man has been held at bay, his activities have not done the damage to archaeological sites that has occured in more favorable climites. However as more people discover the recreational opportunities offered by the desert, and as more acquire the 4-wheel drive vehicles that enable them to penetrate into the remote areas, archaeological values are beginning to be eroded.

A large part of the desert lands in the United States are still within the public domain. The Bureau of Land Management is charged with protecting desert values, and at the same time making the recreation facilities of the desert lands available to the public. The Bureau is moving to meet its responsibility in both areas.

DESERT DANGERS

The desert has the potential to kill, and as more people use the desert for recreation, the dangers that await the unwary, are taking an increasing toll of human life. If you plan to visit the desert, a few words of caution are in order.

As noted in the previous article, the automobile eliminates much of the danger and hardship associated with a desert visit or crossing. But an automobile can also leave you stranded far from human help if it breaks down. Before venturing into the desert, you should make sure that your car is in good condition.

Overheating can cause a real problem, so pay attention to your cooling system. Make sure that your radiator is full and check radiator hoses and the fan belt. You should also make sure that your gas tank is full and that tires, including the spare, are properly inflated and in good condition.

Desert terrain can be treacherous. Keep on the lookout for mine shafts, and check the depth of sand and the steepness of slopes before venturing into off-road areas.

If you plan to visit a remote area, you should let somebody know where you are going and the approximate time you plan to get back. It is always advisable to have an emergency supply of drinking water.

If you have a breakdown, you should remain with your car unless you are absolutely certain that you know the way to the nearest help and are sure that you can make it.

If you stay with your car, rest in the shade. Make use of seat covers, blankets or anything that is available to shade you from the sun. Do not lay on the ground. Ground temperatures may be 30 degrees hotter than air temperatures.

You should raise the hood of your car since this is recognized as a distress signal.

If you do leave your car, you should leave a note indicating your time of departure, and the direction you are headed. Travel by night if possible. If possible stay on the road. Rest 10 minutes or more out of each hour.

Do not remove your clothing. Clothing helps prevent dehydration. You should also keep your mouth closed to cut down on the loss of moisture. Do not talk, eat, smoke or take salt. If you do not have a hat, find something to keep your head covered.

Contrary to common belief, you should not ration your water. It is better to drink ample quantities than to risk dehydration by stretching your supply over too long a period.

To sum up: take precautions to avoid getting stranded. If you do get stranded, your chances are probably better if you stay with your car. Stay in the shade. If you must leave your car, leave a note, travel by night and rest frequently. Keep your clothing on and your head covered. Do not try to ration your water over too long a period of time.

The Cactus Nappers

Cactus are Fascinating Plants that Offer Lucrative Opportunity to the Cactus Napper.

A new kind of outlaw roams the public lands.

He is the "cactus napper," and he strips the desert and mountains of succulent plants — plundering a national resources that may never be replaced.

The activity has become so prevalent that many western states have passed laws to protect their native vegetation, and the Bureau of Land Management, responsible for the administration of much of the public land in the west, has issued emergency regulations for the prosecution of offenders.

Just what attractions do these prickly plant hold?

When people think of the desert, they almost invariably think of cactus along with heat, sand dunes and rattlesnakes. Almost everyone has seen a cactus, either in the wild, in a pot or in the movies. Because of their odd shapes, spines and habitat, they are among the most intriguing of plant for many people. Yet, for all of this interest, few people know much about them.

The cacti are "native sons." They evolved in North and South America, and except for a few obscure species, whose seeds were probably carried to Africa, Madagascar and India by birds, they are restricted to the New World.

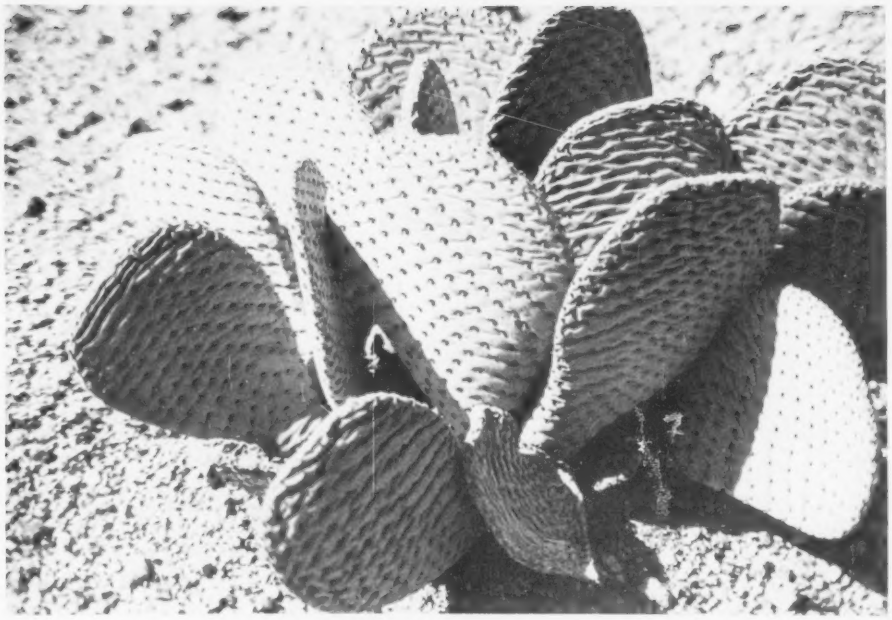
Fossil records indicate that cacti first appeared in the Caribbean Islands. There a relative of the rose became better adapted to a dry climate than the rest of the family. It didn't look much like today's cacti. It was a small shrub that had thick, juicy leaves and green stems for storing water. What made it a cactus was a complex structure called an "areole," a tiny double bud. The areole, from which flowers, fruits and spines grow, is found only among the cacti and is their identifying feature. If a plant does not have an areole, it cannot be a cactus.

As the deserts of North and South America formed and expanded, these primitive cacti found new homes to colonize. Moving from their ancestral home in the islands, they evolved into new forms that were even better adapted to living in dry climates. Today, they extend from Patagonia in South America to the Peace River in Canada and as far west as New York and New England.

There are about 1,000 different kinds of cacti. They fall into three main groups: The ancestral leaf-bearing cacti, still found in the Caribbean Islands, form one group. The second group includes the Chollas and prickly pears. These plants are characterized by flattened or cylindrical joints that bear rudimentary leaves when young. The third, and by far the largest group, includes all the other cacti. This is an extremely diverse group, that can be further divided into those having ribs and those that

The dark spine-like growths on this young Cholla stem are the only leaves it will ever have. Even these vestigial leaves will soon disappear.

Robert J Sulenski
Washington Office



Strange shapes are only one reason they have become popular for landscaping in desert regions.

have nipples or tubercules. They range from dime-sized plants to tree-like forms that may reach 40 or more feet and weigh tons. They may be branched or unbranched, solitary or clustered, covered with spines, hair or entirely naked. They may be cylindrical, triangular or even rectangular in shape. They are ground-hugging pancakes, climbing vines and those that crawl along the ground like huge, spiny snakes. And of course they can grow straight up.

Cacti are usually associated with deserts and they are a characteristic feature of arid lands, but they also grow in jungles, along seashores and high in the mountains. They can grow anyplace where water availability is a problem even some of the time. The secret of their success is their ability to soak up water rapidly and to store it a long time for use during dry spells.

To do this they have evolved a root system that can absorb water as soon as the soil gets wet and funnel it into the plant's body. Once water is absorbed, it is protected from loss in several ways. First is the lack of leaves. Since most of a plant's water is lost through its leaves, plants adapting to arid climates must reduce the size of their leaves or eliminate them entirely. Cacti have reached this goal, and are leafless. The only exceptions are very primitive cacti, which still have regular leaves, and the prickly-pears and chollas which have tiny leaves when they start to grow in the spring, but lose them within weeks.

Once gathered by the roots, water is stored in special cells within the cactus's body. In these cells, water is attached to a glue-like substance, where it can be removed by the plant as needed.

The idea that you can open a cactus and have torrents of water gush out is a myth. But for those who know where to look, a cactus can be a lifesaver. The water is available but must be squeezed or chewed out of the pulpy tissue. After working hard to collect and store its sparse water supply, a cactus does not give it up easily. In fact, if a person is not careful, getting water from a cactus can be extremely dangerous. The pulp of the cactus should never be swallowed in the hope that it will yield even more water than by squeezing. While in the stomach, chemicals in the pulp will begin to absorb water from the body and can actually further deplete the body's water more than it was before the pulp was eaten.

The cactus protects its precious water supply in other ways, including reducing the number of pores through which water can escape and by producing a waxy coating which further reduces water loss. Spines are also produced. These shade the plant from the sun, lowering its temperature. The spines also break the force of the hot dry desert winds and further reduce evaporation. Spines also keep the plant from being eaten by grazing animals, but they fail to protect plants from many smaller animals like the ground squirrel. Some of these smaller animals seem to be completely unafraid of the spines and clamber over, around and through the needle-sharp points.

Cacti do produce flowers, but like everything else that requires

water, the plants are very frugal about flower production. The flowers are generally large and showy. They may be pure white, yellow, orange, red, pink, brown or green. Many cacti flowers are striped and have a satin-like sheen that is metallic.

Each flower lasts for only a day or two, and the whole blooming season is compressed into a few short weeks. The timing of the blooming is uncanny. One day there are only the buds, then within a few hours flowers on many separate plants open waiting to be pollinated by bees, hummingbirds, moths, butterflies, doves, and in some cases, even bats. The end of the blooming season has the same uncanny timing. One day the plant has flowers; flowers are rare the next day, and the day after that they are gone.

The fruit produced by the cactus is highly prized as food. It is eaten by birds and mammals as well as by lizards and desert tortoises. Even the coyote will temporarily abandon his usual diet of mice and ground squirrels when cactus fruit gets ripe.

Among the desert Indians the annual gathering of cactus fruit was a solemn ritual that emphasized their closeness to the desert world. The practice is still continued in some areas. What the Indian saw as a ritual has become a business to others. Jams and jellies made from the cactus fruit are sold in many parts of the Southwest.

The cactus fruit may contain hundreds of seed, and a plant may produce millions of seed in its lifetime. Most of these seed never have a chance to sprout. They are eaten by many animals including rodents, birds and insects. Many are killed by the hot sun, but a few always survive. If they land under a bush, tree or stone, out of the sun and sight of hungry animals, the seed may have a chance to sprout.

Landing in a shady protected spot is only a part of the battle. The rain must be sufficient to allow the seed to sprout. Until the seedling can grow a large root system, it is always in danger of death by drying. Many die before they are large enough to cope with the desert environment. They are extremely sensitive to strong sunlight, and will die if exposed to the direct rays too soon. And, of course, there are always hungry animals ready to include a small, juicy cactus seedling in their diet.

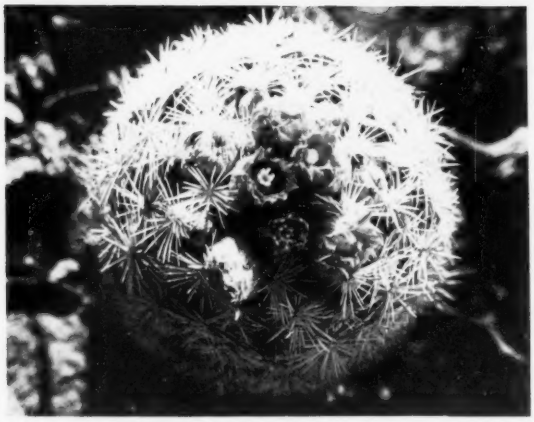
But some seedlings survive to replace the parent and perpetuate the species. Of all the thousands or millions of seed a plant may produce in its lifetime, only one needs to survive and grow. One new plant will replace one old plant, and thus the species will survive.

Because of their odd beauty and ability to withstand drought, cacti have been introduced into many parts of the world where they do not occur naturally. The results of these introductions have varied with the new environments. In Australia, prickly-pears became a pest and covered hundreds of thousands of acres before they were finally brought under control through the introduction of diseases and insects that attacked the plants. Around the Mediterranean Sea cacti have become a part of the normal landscape. So much so, that native-born Israelis are called "Sabras," the local name for an introduced cactus.

Spines protect cacti from sun, heat, wind and animals.

Cacti time their blooming with precision. In a day or two the flowers open, are pollinated and die.

Only the presence of an areole identifies this leafy shrub as a cactus. All cacti evolved from ancient plants similar to this one that grows on the Caribbean Islands.



Aptly named, the pin cushion cactus has white spines that make it rebemble a golf ball. Flowers may be yellow, orange or brown.

This Fish-Hook cactus blooms in June. Often the flowers are as large as the rest of the plant.

The motives that lead to cactus napping and the impacts it has on desert lands is described in an article "Please Don't Pick the Butterworts" by Mariana Gosnell that appeared in the April-May 1976 issue of National Wildlife. Ms. Gosnell writes:

One state that does take its enforcement very seriously is Arizona, where landscaping with giant desert plants — saguaros and barrel cacti and ocotillos — is a thriving industry. Richard Countryman is assistant director of the State's commission of agriculture and horticulture and head of its "cactus cops."

"In just forty minutes," he says, "you can pick up $400 to $500 worth of cactus. A nice sized barrel cactus gets you $12.50 to $17.50; a saguaro $10 a foot. It's as profitable as cattle rustling used to be."

The sacking of the desert goes on elsewhere in the South as well. Del Weniger, professor of botany at Our Lady of the Lake College in San Antonio, Tex., mourns a tiny casualty of the drug craze. "Five or six years ago," he wrote, "I knew thousands of acres in the lower Rio Grande Valley where epeyote grew in profusion under almost every shrub, but visits to one after another of these locations now show them barren of even a surviving specimen after the crew of gatherers have been through." They don't even leave enough, say Marshal C. Johnston, director of the Rare Plant Study Center in Austin, Texas, to make a new generation.

Cactus clubs also contribute to the pillage as do souvenir hunters, cactus-candy makers, black market gardeners, and even dope peddlers, who've been known to transport and store drugs in hollowed-out barrel cacti. According to Lyman Benson, cactus expert and professor emeritus at Pomona College in California, 26 percent of all American cacti are endangered. Many of them are so rare, says Edward S. Ayensu, chairman of the department of botany at the Smithsonian Institution, "they could become be made extinct in minutes."

Why do people collect wild plants, rare or otherwise?

For one thing, many plants are slow growers, an important deterrent to commercial firms. A saguaro, for instance, doesn't start the distinctive branching that makes it a symbol of the western desert until it is about 70 years old. Also some plants are impossible to grow from seed or are simply tedious to cultivate."

Americans have been slow to recognize the value of their native sons for landscaping and for garden plants in the arid and semiarid parts of the country. But today the concept of the cactus garden is one whose time has come.

A well designed garden in an attractive sight, and because of the inherent characteristics of cactus, such gardens are almost work-free. There are no leaves to rake, no pruning or mowing to be done. Plants require very little water or protection from heat or sun.

Unfortunately, the demand for desert plants is now outstripping the legitimate supply. The cactus napper is taking advantage of this gap between supply and demand.

By using various subterfuges such as working at night, falsifying documents and bills of sale and traveling back roads to avoid quarantine stations and commercial checkpoints, he is hauling away plants from the public lands by the truckload to sell to unscruplous or unwitting dealers.

Hopefully with the help of concerned citizens and local and Federal agencies working together, the cactus napper will be beaten and the cacti and other desert plants will be preserved for future generations to see and enjoy.

SAND FOR RECREATION

At Little Sahara Young and Old Come to Play in the Sand

Stewart L. Jacobson
Richfield, Utah District Office

With the increasing concern over the environment, off-road vehicle enthusiasts are looking for places where they can enjoy their sport without arousing public concern over the damage they may do to the surface of the land. Much of the west is either desert or semi-desert, and desert lands often have an extremely fragile ecology. The sparse vegetation that grows there wages a constant struggle for existance, and if it is destroyed, years may pass before the land fully recovers.

Today, there are places in the west where the tracks of tanks used in maneuvers during World War II are still clearly visible. Off-road vehicles can cause the same kind of damage, and in recent years there has been increasing demand that the use of these vehicles be prohibited or controlled.

The amount of damage an off-road vehicle does to the land depends on several factors — one factor is soil. One kind of soil that shows little or no damage from off-road driving is sand. Wind action constantly changes the surface character of sand and quickly erases the imprint left by man and his vehicles.

In Utah, 150 miles south of Salt Lake City on U.S. Highway 6, the Little Sahara Recreation Area containing 60,000 acres of sagebrush flats, juniper covered hills and free moving sand dunes offers a variety of challenges for the off-road driver.

The dunes originated as sand bars deposited on the southern shore of Pleistocene Lake Bonneville. The lake dried up and over thousands of years winds pushed the sand north across the prehistoric Sevier Desert at an average rate of 18 inches per year until it came to rest in the form of dunes around a 700-foot ridge in west central Utah known as Sand Mountain.

In the early 1900s a dirt road was built along the north end of the area to link highways 50 and 6 with the town of Callao, Utah. The road opened the area, and soon families came to play in the miles of clean, restless sand. Nature enthusiasts and photographers began to explore the area, and discovered the unusual plant and animal life that lived there.

Dune buggies became popular in the 1960s. By 1964 over 10,000 people were visiting the dunes each year. At the north end of the dune area, where most of the activity was concentrated, BLM developed temporary facilities to accommodate the increased use. By 1972 visitor use of the area had increased ten-fold. With 100,000 visitors each year, the facilities could no longer accommodate the people.

The increased pressure was beginning to make an impact on the land. Juniper trees, that once provided shade and protection from the wind, were cut for firewood. A network of roads and trails could be seen throughout the area. Owls, foxes, and other wildlife, that had once inhabited the juniper stands, began to disappear. A herd of antelope, that had grazed in the area for years, left.

As visitor pressure on the area increased, conflicts between off-road drivers and other users developed. Naturalists, campers and picnickers complained about motorcycles and dune buggies that roared through campgrounds endangering children and shattering the serenity of the dunes. Others complained that the vehicles made the dunes a precarious place for sunbathers.

In response to these complaints, BLM cooperated with various user groups to develop a plan that would resolve conflicts in the area and to protect its unique plant and animal life. The plan also provided

A city of campers gathers for drag races on an Easter Weekend. The track is at the base of the mountain.

for mining, livestock use and other traditional uses along with recreation.

Beginning in 1969, BLM surveyed visitors to learn what development and management they felt would be appropriate for the area. At the time, the Bureau conducted studies in cooperation with local universities to find qut about unusual plants and archaeological resources that would need protection. Eventually all this information was incorporated into a proposed plan for management of the area. In 1972 that proposal was presented for further public input and the public's comments and suggestions were considered before a final plan was adopted. As a result, 60,000 acres of the sand dune area was formally designated as the Little Sahara Recreation Lands in April of 1976.

Under the plan, the area was divided to separate incompatible uses and to minimize user conflicts. Off-road vehicles were separated from campers and picnickers, and nature study areas were separated from areas where sandplay was encouraged.

BLM personnel from the Richfield District implemented the plan in phases according to the money and manpower that was available. A unique fencing system was designed to confine conflicting uses to their particular areas. Facilities including flush toilets, charcoal grills and tables were built for campers picnickers and other users. Paved roads and parking areas were constructed to accommodate the large crowds that come to the area in seasons of heavy use. The roads replaced the network of narrow, dusty trails that once provided the only access to the different areas of the recreation complex.

A visitor center and warehouse complex has been constructed to further accommodate the needs of the public and the BLM staff assigned to the area.

According to Howard C. Stutz, professor of botany at Brigham Young University, the area included in the Little Sahara Area is the only place in the world where the giant fourwing saltbush (Atriplex canescens) is known to grow naturally. This variety grows 10 to 12 feet high and may spread out to cover an area of 12 to 15 feet. These plants seem to be the last remaining relic of a species that was once widespread.

Other fourwing saltbushes, relatives, or perhaps descendents of the Sahara giant are much smaller, flower earlier, are more woody and have smaller fruits. The difference in the outward appearance is reflected in the chromosomal structure.

The Sahara Area saltbush is highly palatable to grazing animals. Plants transferred to others areas are soon completely devoured by rabbits, livestock and other animals. This palatability may have been their undoing. Professor Stutz believes that because the plant was so well liked by so many grazing animals that it was grazed into extinction on all other areas and survived in the Sand dunes only because it was safely beyond the reach of hungry animals.

BLM has installed campground facilities to accommodate visitors.

Conversely, the smaller saltbushes cannot grow in the sand dunes because they do not grow fast enough to escape the ever shifting sands. Only the giant saltbush grows fast enough to "keep its head above the sand."

Because of its remarkable features, the giant saltbush may have a potential for a number of economic uses. Given the protection that can now be afforded by controlled grazing, it has a potential for increasing forage production on the western range. It produces many seed which have a high rate of germination — at least twice that of other varieties. It grows nearly as fast as alfalfa, producing 3 to 4 feet of new growth in a single growing season. Its twigs and leaves are highly nutritious.

It is also an attractive plant. It may have a potential for use in landscaping, particularly around desert recreation areas. It is also highly fire resistant and could be used in green belts around homes and other areas susceptible to fire

Because the giant saltbush grows only in the sand dunes of the Little Sahara, it is necessary that it be protected. To ensure this protection and also provide opportunity for many kinds of resource use, BLM conducted a resource inventory to determine the extent and exact location of the various resource values. The dunes were evaluated for off-road vehicle use. Rating ran from excellent through good, fair, poor and nearly impassable based on size of dune, maneuverability between dunes, amount of vegetation present and the presence of tree stumps and other hazards.

In making the evaluation, the BLM resource team examined topography and checked the types of vegetation throughout the area. They carefully mapped the location and density of the giant four winged saltbush and other endangered species.

The survey showed that the best areas for off-road vehicles were those that contained little or no vegetation. Even the smaller plants tended to built up sand ridges on their leeward side that made rough riding for dune buggies. The team found that while off-road vehicles had caused some damage to vegetation in the area, drivers in general tended to avoid vegetation of any type. The open unvegetated dunes appeal to off-road drivers in the same way that powdered snow appeals to skiers.

Observations made over the past several years indicate that a majority of the vehicles that use the Little Sahara do not venture far. Most stay within a mile of the area's edge. On the other hand, the denser stands of the giant saltbush grow into miles or more from the edge of the area. The probability of extensive damage to the plant from off road drivers seems remote.

BLM has proposed the designation of a Natural Area that would encompass the greater concentrations of the plant. These concentrations are mostly on the west side of the area and the designation of the proposed Rockwell Natural Area would carry provisions that would prohibit off road driving, the use of camp fires or the gathering of wood within the Natural Area. If the designation is made it would be after the public had the opportunity to comment on the proposed plan.

BLM officials in the Richfield District hope that the comprehensive resource inventory will help the public see the need for appropriate restrictions and management guidelines. They believe that cooperation between BLM and the public will solve potential conflicts and increase public enjoyment of the area without causing undue harm to the area's very interesting ecology.

Participants line up for a motorcycle race.

Ranger in the Desert

17 BLM Rangers Patrol the California Desert Conservation Area.

Steve Smith
California State Office

Lynell Schalk is a BLM ranger assigned to the El Centro Area Office in the California Desert. On October 1, 1978, she was instrumental in saving a human life. The following letter received by the Bureau's Riverside District Manager tells the story.

Dear Sir:

I would like to take this opportunity to pay tribute to one of your rangers. Lynell Schalk.

On October 1, 1978, we responded to an accident on I-8. The victim was trapped in the vehicle about 30 feet down a steep rock embankment. Disregarding her own safety, Lynell was working on the victim when we arrived. During extraction of the victim, she never slowed down. She continued taking vitals during the process. The professionalism she displayed during this accident was simply magnificent.

Lynell is a familiar face in Ocotillo as a BLM ranger, but on this day she garnered the deepest respect of the Ocotillo Fire Department as a dedicated devoted humanitarian. It was a distinct pleasure to work with her in this life-saving situation.

Your agency should be commended for having such a dedicated person serving as a BLM ranger.

Sincerely,

Burr W. Seeley, Chief
Ocotillo Volunteer Fire Department

Ms. Schalk is one of the 17 BLM rangers assigned to the California Desert Conservation Area. Her experience on this occasion is probably not typical of a ranger's average day, but neither is it unusual.

As public interest in the desert has grown, recreation visits to desert areas have increased dramatically, and the Bureau of Land Management has found it necessary to provide more visitor services and to increase the level of protection of unique desert resources.

This has been especially true in southern California where BLM has jurisdiction over an area of public land covering 12.5 million acres, about half of the California Desert. In close proximity to major population centers, this area hosts millions of recreation visits in a single year. Such public use now threatens the very values that make the desert attractive to so many people

In 1976, Congress recognized the special significance of the public lands that make up so large a part of the California Desert when it passed the Federal Land Policy and Management Act. In that Act, Congress designated this area as the second National Conservation Area (the first was the King Range north of San Francisco) and made the Bureau responsible for the planning, management, and protection needed for the area.

Through the Federal Land Policy and Management Act, Congress recognized the fragile nature of this desert area and its special resource values. FLPMA called for a program of multiple-use management with special emphasis on the area's value for outdoor recreation. The Act calls for further studies of the relationship between man and

The first group of 13 California Desert Conservation Area rangers was sworn in by BLM's California Director Ed Hastey on April 7, 1978.

the desert's environmental values. It charged the Secretary of the Interior with the identification of the boundaries of the lands to be included in the Conservation Area, and the development of a long-ranged management plan to be completed on or before September 30, 1980. While these plans are being developed, the Act requires the Secretary to provide interim management to protect the desert resource values until the final plan becomes operational.

The Secretary is further charged with the development of reasonable mining regulations for the public lands within the Area, with the appointment of a California Desert Conservation Area Advisory Committee, and to provide a program of law enforcement to protect the archaeological and other values of the California Desert Conservation Area and adjacent lands.

In this latter matter, the Bureau had already taken steps to protect desert resources when the first ranger staff for the California Desert was hired in 1972. The greatest significance of this provision of the Act was that it gave the ranger force law enforcement authority.

As originally conceived, the ranger staff would be an on-the-ground force to work with visitors and other desert users in a program of public education to enhance the average citizen's appreciation of the desert's many unique values and to emphasize the need for their protection. The rangers also provide visitor services and gather data to support the Bureau's management efforts for the area. Since 1972, the details of the ranger program have been in the process of development.

From its past experience, the Bureau recognized the need for a uniformed staff of full-time rangers making regular and systematic patrols of the desert area. Personnel were carefully selected, and training was extensive. Applicants having a background in law enforcement or resource management were preferred. Once fully trained, the individual ranger was expected to understand the Bureau's resource program, be able to do interpretive work, be able to render emergency assistance to visitors injured or otherwise distressed, and finally able to enforce the laws that apply to the Conservation Area.

Emphasis has been placed on preventing violations, rather than making arrests. The individual ranger is expected to establish a rapport with visitors and be willing and able to explain the logic behind a particular regulation. A ranger is responsible for the enforcement of provisions of the land and Water Conservation Act, the

This vehicle is especially designed for desert ranger use. Special features make it useful for Dune Patrol to respond to accidents and to provide transportation in search and rescue operations.

Providing information and helping visitors understand the desert's fragile resources takes up much of the ranger's time. This class will have a better understanding of how they can enjoy the desert's resources without causing undue harm.

National Trails System Act, the Sikes Act, and the Wild Horse and Burro Act. With other laws and regulations, arrest is reserved for flagrant violations and repeat offenders.

Enforcement authority pertaining to crimes against people and their property is the responsibility of State and local police. However, the ranger is expected to provide support and assistance where it is warranted or needed.

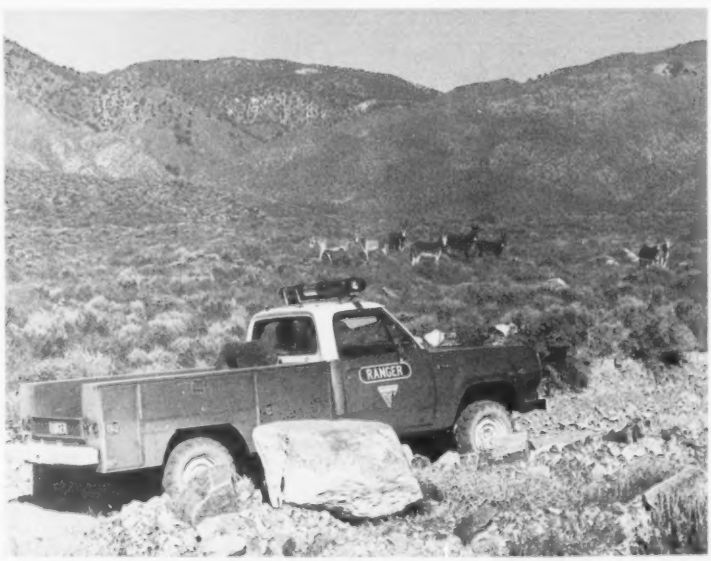
Uniformed and with a distinctive vehicle, the ranger provides a visible presence to remind visitors they are in a regulated area.

Many visitors now use recognition of the ranger's car and uniform to seek out information about the location of sites for camping and rockhounding as well as for information about special desert features they encounter. Rangers are encouraged to be well informed about the desert ecology and to share this knowledge with visitors.

In making rounds, the ranger is in a unique position to gather data about the desert's resources—archaeological sites, habitat for plants and animals, and also information about areas that have appeal to visitors. A ranger is required to maintain a logbook of activities and observations. This information is proving to be of tremendous value to desert planners and managers.

In order to ensure systematic patrolling of the entire Conservation Area, it has been divided into patrol unit known as "Sectors." There are now 17 rangers responsible for regular patrol over 32 sectors. In order for the rangers to cover their assigned area without the need for being away from home overnight and with a minimum of time, travel and effort, the 17 rangers (their number now includes one woman) are divided among seven duty stations located at strategic points within the Conservation Area.

The typical day for the ranger starts when on reporting to headquarters office in the morning to check the logbook and learn if there are specific things to be checked into while on patrol. The ranger also spends time with the office staff and resource specialists to find out about new developments affecting Bureau programs. The ranger is likely to be asked to check the progress of a resource project, or the compliance of a private contractor or permittee. Before leaving, the ranger makes sure to have the forms, papers, maps and other kinds of information which may be needed for the day and that the ranger's vehicle is equipped with those items which



Watching each other could be the title of this picture. Wild Burros are protected under the Wild Horses and Burros Act. In the California Desert Conservation Area they comprise one of the ranger's responsibilities.

may be needed to help visitors.

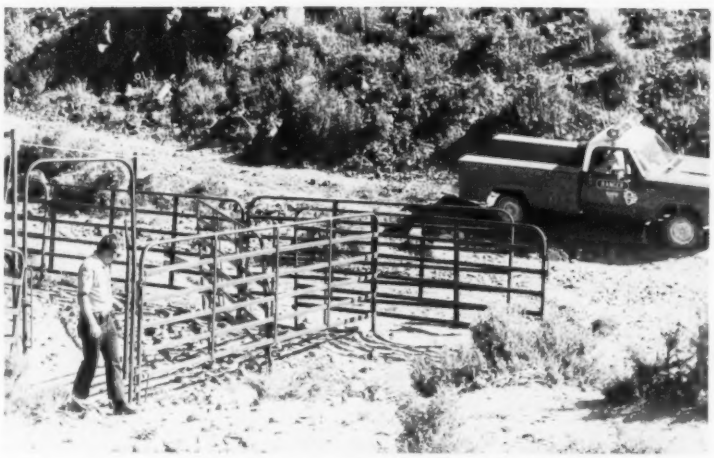
The travelling ranger is constantly on the lookout for visitors who may want information as well as for those who may be in trouble. Common visitor needs are directions and help with a stranded automobile. A car stuck in soft desert sand, or disabled because of a cracked radiator hose or broken fanbelt, are among the more common problems.

A more dramatic but less common demand is when the ranger saves a human life, or becomes involved in a search and rescue situation. In the harsh desert environment, any stranded motorist is a potential fatality. In addition, the ranger may be called to the scene of an off-road vehicle accident, to attend an injured hang glider enthusiast or administer first aid to a visitor bitten by a rattlesnake.

Although the ranger prefers to be just the visitor's friend, times do come when it's necessary to assume the role of a policeman.

During the first 6 months of 1978, rangers reported 564 violations of the laws and regulations pertaining to the California Desert Conservation Area. More common violations included theft of desert plants, removal of archaeological artifacts, defacing of sites, vandalizing signs, and improper use of off-road vehicles.

A ranger checks an area closed to off-road vehicles. This is the Saline Range one, of the few large areas of pristine lands in the California Desert Conservation Area.



A ranger checks a burro trap. The gathering of many kinds of information is an important part of the ranger's job.

A ranger takes information that will initiate a search and rescue operation. The report concerns a missing friend. Harsh desert climate makes any stranded visitor a potential fatality.

In most situations, the rangers were able to substitute persuasion and diplomacy to avoid using their powers of arrest. Much of the damage done to desert resources is the result of carelessness or from a lack of understanding rather than from a will to destroy. Rangers even find that most violators want to preserve the desert's values and will desist once they understand the reason for the law or regulation that prohibits their activity.

The rangers of the California Desert Conservation Area are writing a new chapter in the management of an important national resource. As visitor use of the desert increases, the potential for the destruction of the desert environment grows. But with the dedication and efforts of this small force of men, the destruction may be avoided. If it proves to be so, their effort will have been worthwhile.

The Buying of Louisana

Napoleon Made an Offer the Ambassadors Couldn't Refuse.

Eighteen hundred one was an inaugural year, and on March 4, Thomas Jefferson became the first President to be inaugurated in the Nation's new capitol on the Potomac. As he took the oath of office on the east steps of the unfinished capitol building, the new President could see a field of raw tree stumps and mud over the heads of those assembled below. If the scene was bleak, so was the Nation's future.

The West — that portion of the United States west of the Appalachian Mountains — was under a new threat because of recent events in Europe. The French Revolution that Jefferson had so ardently supported while Secretary of State under Washington, had somehow gone wrong. A military leader, Napoleon Bonaparte, had come to power and made himself absolute ruler of France and a threat to all Europe. Now there were disturbing rumors that Bonaparte was urging Spain to return all territory that France had ceded to Spain in 1763. That would include all of Florida and the present Spanish territory at the mouth and west of the Mississippi River, known as Louisiana.

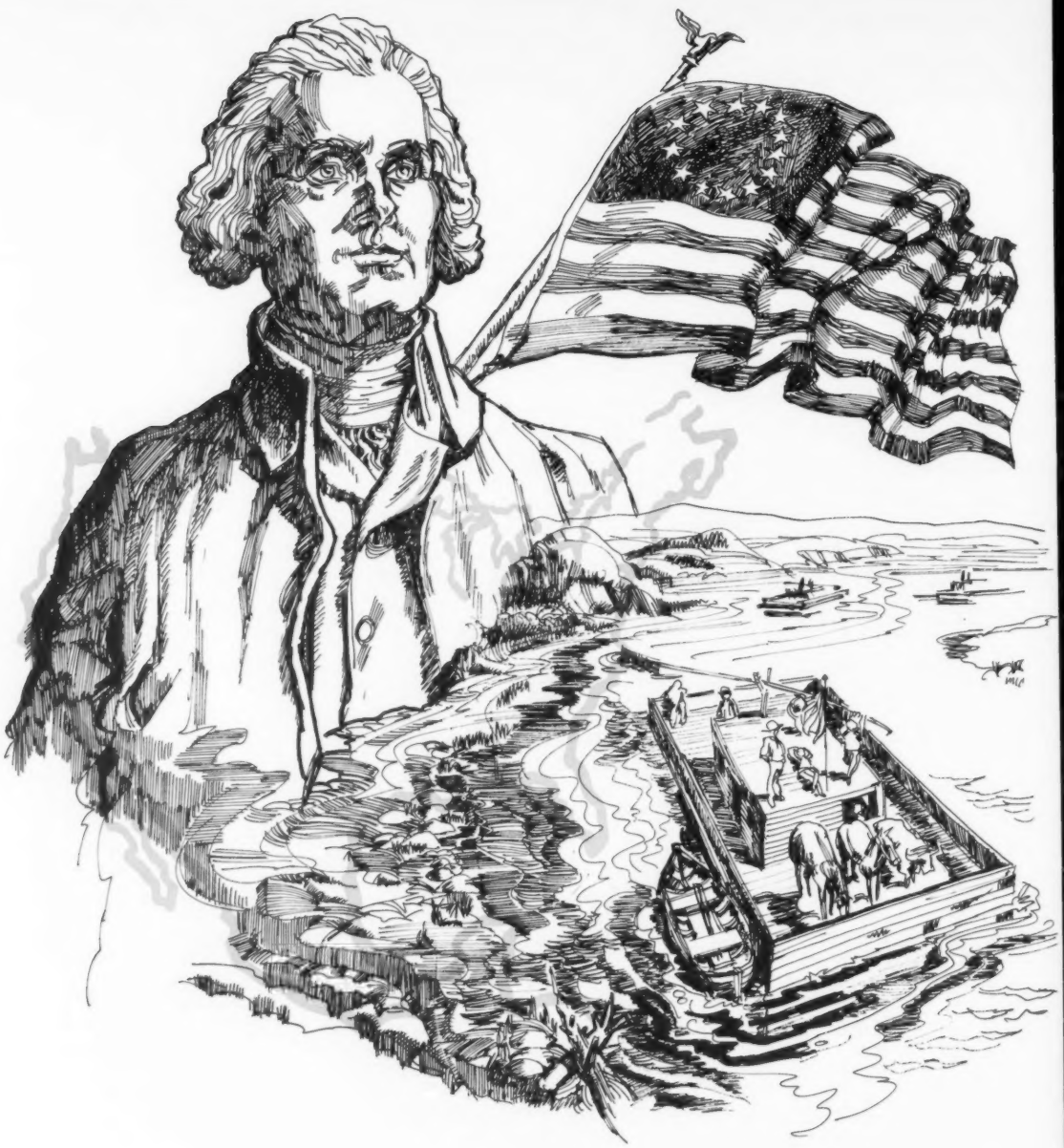
Napoleon's army was the most powerful in Europe. If he gained control of the mouth of the Mississippi River, he would have the military strength and the strategic location to cut off trade and foreclose any hope of westward expansion of the Nation.

This was not all that preyed on the mind of the new President. Equally disturbing was the possibility that England might try to forestall French occupation of New Orleans by sending an army out of Canada down the Mississippi. That river was vital to western trade and development. A few years before, even a weak power like Spain had wreaked havoc among the western settlements when she closed the port of New Orleans to American river traffic. To have a strong power like either England or France in control of the city would be intolerable for the United States.

The rumor was entirely true. Napoleon had started to negotiate with Spain early in 1800. Spain's experience in ruling Louisiana had not been a happy one. The colony had not prospered, and there had been little to compensate for the cost of its administration. She had no qualms about returning Louisiana. Florida was a different matter. Spain had controlled this area longer, and the population was predominately Spanish rather than French as was the case in Louisiana.

On October 1, 1800 the Treaty of Ildefonso returned Louisiana, but not Florida to France. That portion of the Treaty was secret, but by the time Jefferson was inaugurated, bits and pieces had leaked, and he knew something was afoot.

Paul C. Herndon
Washington Office



He was determined to keep France from gaining control of New Orleans. Such a military force controlling the mouth of the Mississippi would keep half of the territory of the United States from growing and prospering except at the whim of a foreign power.

Early in his administration, Jefferson appointed four men who would eventually be involved in the negotiations over Louisiana. They were: Robert Livingston, Ambassador to France; Charles A. Pinckney, Ambassador to Spain; Rufus King, Ambassador to England and James Madison as Secretary of State. It is fortunate that the President trusted all of these men. It took a month for a message to cross the Atlantic, and momentous decisions would have to be made without the Ambassadors having opportunity to consult with their President.

Since Jefferson had no way of knowing for sure that such a transfer was actually contemplated, he could give only general instructions to Livingston. Livingston was to find a way to suggest that Napoleon should sell Florida and New Orleans to the United States.

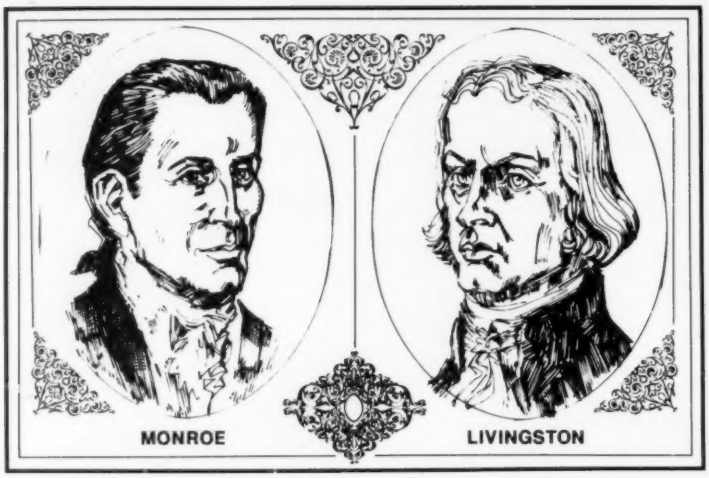
By May, 1801, there seemed to be more substance to the rumors.

From the State Department, Madison had information that seemed to indicate that the transfer was imminent. On the 14th of that month, Jefferson publicly expressed his concern over the matter.

Livingston arrived in Paris on December 3, 1801. By this time Rufus King had reported from London that England was about to make peace with France. That would leave Napoleon free to concentrate on taking control of his new North American empire.

Rumor took on substance on February 18, 1802 when Rufus King sent a copy of the agreement signed by France and Spain to Washington. In April Jefferson warned France that the United States would consider any nation that occupied the mouth of Mississippi as her enemy. He also pointed out that such an act on the part of France would force the United States into an alliance with England. At the same time, he urged Livingston to press Napoleon to set a price on west Florida and New Orleans.

A serious situation became grim a few days later. On April 24, Livingston reported that General Jean Bernadotte was gathering an expeditionary force of five to seven



thousand men to occupy New Orleans.

More fuel was added to the flames in October when Spain again unaccountably closed the Port of New Orleans to American commerce. Here to fore the closures had aroused anger only among the settlements west of the Appalachians Mountains. This time the reaction was nationwide. From Boston to Savannah, Americans were threatening to take New Orleans by force of arms.

Through November and December Livingston continued to press the French for an answer to the United States' offer to buy west Florida and New Orleans. The plea seemed to fall on deaf ears. The expeditionary force under Bernadotte had been delayed, but only so that an even larger force under the command of General Claude Victor could be assembled.

In retrospect it seems that only fate prevented France from establishing an empire in North America. In December 1802 Napoleon learned of his first military setback. A large French Army sent to occupy Santo Domingo had been destroyed by a combination of native resistance and an epidemic of yellow fever.

For a time the reverse seemed to make him more determined than ever to occupy Louisiana. On the 19th he ordered General Victor and an army of 20,000 men to sail for New Orleans. Bad weather kept Victor from sailing.

On January 11, 1803 Jefferson appointed James Monroe as a special envoy to France and Spain with instructions to impress both governments with the determination of the United States to prevent foreign control of the mouth of the Mississippi River. On the 18th he sent a confidential message to Congress suggesting that an American expedition be sent to explore the Missouri River.

James Monore arrived in Paris on April 13. Neither he nor Livingston had any inkling that the matter of Louisiana had already been decided.

A month earlier Napoleon had made up his mind to renew his war with England. In reaching that decision he had, in effect, abandoned all possibility of establishing a French empire in North America. In the face of hostilities from the British navy, there was no way he could support an occupation of New Orleans.

A few days before Monroe arrived in Paris, Napoleon had instructed his Minister of Finance, Francois de Barbe-Morbois to sell Louisiana.

On the afternoon that Monroe arrived in Paris, the Minister and Livingston went for a walk in the gardens while Monroe studied papers detailing Livingston's previous negotiations concerning the sale. Suddenly de Barbe-Morbois asked Livingston what the United States would pay for all of Lquisiana.

The offer caught both Livingston and Monroe by surprise. All their instructions and all negotiations had been directed toward the purchase of New Orleans and west Florida. Suddenly they were offered half a continent. No thought had been given to such an acquisition. There was no time to seek directions from Washington.

Under the circumstances they decided on a bold course. Throughout the rest of April they haggled over terms, but on May 2 after a state dinner with Napoleon, the Ambassadors signed the treaty which was dated April 30.

They had agreed that the United States would pay $11,250,000 in cash and assume certain obligations France owed to American citizens. Altogether the cost amounted to about $15 million. In return France transferred all territory she had received from Spain in the Treaty of San Ildefonso — an area that more than doubled the size of the United States. Since Florida was not France's to sell, it was not included in the deal.

The treaty was delivered to the State Department on July 14, 1803. Although the purchase raised serious constitutional questions, (Jefferson always believed that he had exceeded his Presidential authority in buying the Territory) the Senate ratified the Treaty on October 21.

All that remained was for the United States to take control of the Territory. Spain surrendered jurisdiction over New Orleans on November 30. A special envoy, sent for the purpose accepted control of the city in the name of France and ruled for 20 days. Apparently the envoy enjoyed his brief period of authority for he made changes in the laws and appointed a number of officials. On December 20, the United States took final possession. It was a simple ceremony. Beyond a small honor guard, there were no French troops in the city and perhaps less than a dozen American citizens. At noon the French flag was lowered. A patriotic sergeant of the Republic seized the banner and wrapped it about his body. Then the American flag slowly climbed the flagpole and perversely got stuck halfway up. With frantic effort the line was freed, and when the flag reached to top the few Americans cheered. The transfer was complete; the Mississippi was an American River.

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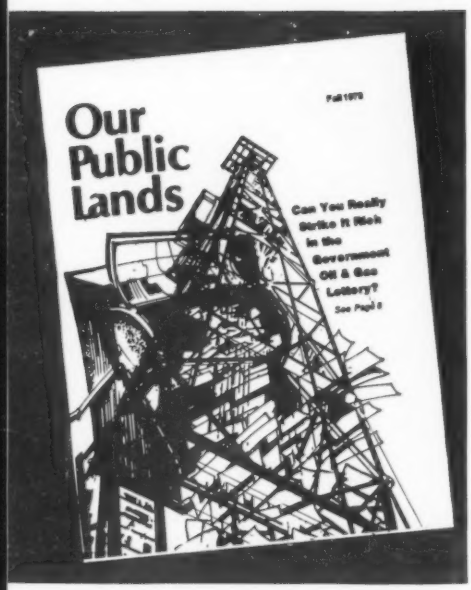

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